

RESEARCH

CHANGE IN THE HYDROCARBON AND COMPONENT COMPOSITIONS OF HEAVY CRUDE ASHALCHINSK OIL UPON CATALYTIC AQUATHERMOLYSIS

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A physical model has been developed for the aquathermolysis of heavy crude oil from the Ashalchinsk oil field at 250°, 300°, and 350°C. Nickel and cobalt carboxylates were used as oil-soluble catalyst precursors. In the presence of a hydrogen proton donor at 300°C, the oil content was found to rise considerably and the resin content was found to decrease by a factor of 1.8, which leads to a decrease in crude oil viscosity by 91% and a decrease in density from 960 to 933 kg/m³. The hydrocarbon composition of the liquid aquathermolysis products was studied by chromatate-mass spectrometry. The average molecular weight of the asphaltenes was determined by matrix-assisted laser desorption/ionization (MALDI) spectrometry. The maximum disproportionation of the hydrocarbons into n-alkanes, alkylcyclohexanes, and alkylbenzenes occurs at 300° and 350°C. The composition of the hydrogen proton donor (tetralin) conversion products at these aquathermolysis temperatures was determined.

Key words: aquathermolysis, heavy crude oil, asphaltenes, catalyst precursor, hydrogen proton donor.

Catalytic systems play an extremely important role in chemical reactions and the synthesis of new compounds, various transformations of hydrocarbons and their derivatives, and in the preparation of

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